


**Koyana Education Society, Patan  
BALASAHEB DESAI COLEGE, PATAN  
DEPARTMENT OF STATISTICS**

**SEMESTER TEACHING PLAN  
Academic Year 2023-2024  
Semester I**

**Class: B.Sc. I**

**Paper No.: I and II (Theory)**

Month	No. of Teaching Days	Periods Allotted	Unit / Topic	Subunits Planned
July	23	17	<b>Paper I : Descriptive Statistics-I</b> Unit 1.1 Introduction to Statistics (3)	Introduction with student, Syllabus, Nature of the Exam. Meaning, Importance of Statistics, Various fields where Statistics is used and Various statistical organizations in India.
			Unit 1.2 Population and Sample (4)	Statistical population and Types, Census & Sampling method, Sampling methods
			Unit 1.3 Nature of Data (8)	Primary and Secondary data Quantitative and Qualitative data Different scales
August	25	21	Unit 1.4 Presentation of Data (4)	Discrete and Continuous frequency distribution, Tabulation, Diagrams and graphs, Box plot.
			Unit 2.1 Measures of Central Tendency (7)	Central tendency, A. M., G.M. and H.M. and its properties, Median Mode, Partition Values. Graphical Method, Uses of averages & Examples
			Unit 2.1 Measures of Dispersion (5)	Dispersion, Range, Q.D., M.D. and M.S.D. with its Minimal property, Variance, S.D. & its properties, C.V. , Examples
September	18	15	Unit 2.3 Moments, Skewness and Kurtosis (4)	Raw & Central Moments, Relation between moments, Skewness, Kurtosis and Examples
			<b>Paper II :</b> Unit 1.1 Sample space and events (7)	Experiment and Random experiment. Types of Sample space, Types of Events, Algebra of Events, Power Set and Symbolic representation
October	24	17	Unit 1.2 Probability (10)	Equally likely events and apriori definition, Axiomatic definition, Proof of the results and examples
			Unit 2.1 Conditional Prob. and Independence of events (7)	Definition and Theorem on conditional probability, Baye's theorems, Independence of events and Theorems. Pair wise & Mutual independence,
			Unit 2.2 Univariate Probability Distributions (finite sample space) (7)	Discrete random variable. p.m.f. and c.d.f., Properties of c.d.f., median and Mode
			Unit 2.3 Mathematical expectation (6)	Expectation of a r. v. and their function, Results on expectation, Mean ,Variance, Raw and central moments, p.g.f. properties

  
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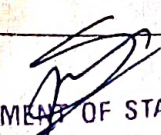
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**SEMESTER TEACHING PLAN**  
**Academic Year 2023-2024**  
**Semester II**

**Class: B.Sc. I**

**Paper No.: III and IV (Theory)**

Month	No. of Teaching Days	Periods Allotted	Unit / Topic	Subunits Planned
Nov.	05	04	Descriptive Statistics-II Unit 1.1: Correlation(04)	Bivariate data. Concept & types of correlation. Scatter diagram, Definition & properties of covariance, Karl Pearson's coefficient of correlation (r) and properties,
Dec.	24	20	Paper III : Descriptive Statistics-II Unit 1.1: Correlation (04)	Rank correlation coefficient, Derivation of the formula for without ties and modification of the formula for with ties. Illustrative examples.
			Unit 1.2: Regression (09)	Concept of regression, Lines of regression, Fitting of lines of regression, Regression coefficients and Properties, Derivation of acute angle between the two lines of regression. Concept of residual, Mean residual sum of squares, Residual Plot Explained and unexplained variation, coefficient of determination, Illustrative examples.
			Unit 2.1 Attributes(07)	Introduction and Notations of Attribute, Dichotomy, class, order of class, positive and negative class, class frequency, ultimate class frequency, fundamental set of class frequency, relationships among different class frequencies (up to three attributes), Concept of consistency, Concept of independence and association of two attributes
Jan.	25	20	Unit 2.1 Attributes (03)	Yule's coefficient of association, Coefficient of colligation, Relation between Q and Y, Correlation Coefficients: 1) Point Biserial Correlation Coefficient, 2) Phi Coefficient, 3) Tetrachoric Correlation Coefficient, Illustrative examples.
			Unit 2.2 Demography (08)	Introduction, vital events and need of vital statistics, Measures of fertility: CBR, ASFR, GFR, TFR, Measures of reproduction : GRR, NRR, Measures of mortality: CDR, SDR, STDR, Population projection at time t, Life Table - construction and its applications in insurance, Use and Applications
			Paper IV Unit 1.1 : Bivariate Discrete Distribution (09)	Definition of bivariate discrete random variable (X, Y), Joint p.m.f., and c.d.f., Properties of c.d.f., marginal and conditional p.m.f., independence of r.v.s, Examples.
Feb.	24	20	Unit 1.2.: Bivariate Discrete Distribution(09)	Definition of expectation of function of r.v.'s, Theorems on expectations, expectation and variance of linear combination, conditional mean, conditional variance, covariance and correlation coefficient, joint p.g.f and properties, Examples.
			Unit 2.1: Some Standard Discrete Probability Distributions (finite)(11)	One point, two-point, Bernoulli Distribution. Discrete Uniform Distribution, Binomial Distribution, Hyper geometric Distribution.
March	10	07	Unit 2.1: Some Standard Discrete Probability Distributions (infinite) (07)	Poisson distribution, Geometric distribution and Negative binomial distribution

  
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**SEMESTER TEACHING PLAN**  
**Academic Year 2023-2024**  
**Semester III**

**Class: B.Sc. II**

**Paper No.: V and VI (Theory)**

Month	No. of Teaching Days	Periods Allotted	Unit / Topic	Subunits Planned
July	23	14	Unit 1.1: Some Bivariate Discrete Distributions (08)	<b>Trinomial Distribution:</b> Introduction, Definition, p.m.f., p.g.f., means, variances and covariance, Correlation coefficient. Generalization
				<b>Bivariate Poisson Distribution:</b> Definition, p.m.f., The marginal and conditional distributions, with mean and variance,
			Unit 1.2: univariate Continuous distribution (06)	Definition of the continuous sample space and continuous r. v., p. d. f., c. d. f, mean, median, mode, quartiles, variance.
August	25	25	Unit 1.2: univariate Continuous distribution (04)	moments, skewness and kurtosis, m.g.f and c.g.f. Transformations of univariate continuous random variable
			2.1 Some Univariate Continuous Distributions defined on Finite Interval (06)	Uniform distribution: Beta distribution of first kind
			2.2 Some Univariate Continuous Distributions defined on Infinite Interval (15)	Beta distribution of second kind: Exponential Distribution Gamma distribution: Laplace (Double Exponential) Distribution
September	18	18	Paper VI: Statistical methods I Unit 1.1 Multiple linear regression. (10)	Concept of multiple linear regression, Fitting of regression plane, definition of partial regression coefficients Residual: definition, properties, mean and variance, Covariance
			Unit 1.2 Multiple and Partial correlation (10)	Definition of multiple correlation coefficient & derivation of formula, Properties, Definition of partial correlation coefficient & derivation of formula, Properties.
October	24	23	Unit 2.2 1.1 Index Numbers (12)	Meaning and utility, problems in construction of I.N., Types of I.N. Tests of I.N. Cost of living I.N.
			2.2 National Income (11)	Definitions of national income, Different concept of national income Methods of estimation of national income and the difficulties in methods. Importance of national income.

  
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**SEMESTER TEACHING PLAN**  
**Academic Year 2023-2024**  
**Semester IV**

**Class: B.Sc. II**

**Paper No.: VII and VIII (Theory)**

Month	No. of Teaching Days	Periods Allotted	Unit / Topic	Subunits Planned
Dec.	24	24	Paper VIII : Statistical methods II Unit 2.1: Testing of Hypothesis I (07)	Population, Sample, Parameter, Statistic, Sampling distribution, hypothesis and their types, type I and type II errors, Critical region, l. s., one and two tailed test, power of test.
			Unit 2.2: Testing of Hypothesis II (15)	Large Sample Tests: $\mu = \mu_0$ , $\mu_1 = \mu_2$ , $P = P_0$ , $P_1 = P_2$ , $\rho = \rho_0$ , $\rho_1 = \rho_2$ Small sample tests : t - test: i) $\mu = \mu_0$ , ii) $\mu_1 = \mu_2$ , iii) Paired t- test, $\chi^2$ - test: i) $\sigma^2 = \sigma_0^2$ ii) test for goodness of fit, iii) test for independence of attributes; a) m x n and 2x2 contingency table, Yate's correction for continuity. F - test: $\sigma_1^2 = \sigma_2^2$ .
			Unit 1.1: Time series (02)	Introduction, components of time series, Additive and Multiplicative model, utility of time series.
Jan.	25	25	Unit 1.1: Time series (07)	Moving averages method, Progressive average method, least square method, Measurement of seasonal indices by simple average method.
			Unit 1.2: Statistical Quality Control (12)	Meaning and purpose of S.Q.C., Process control, Product control, chance causes, assignable causes, Shewhart's control chart lack of control situation. Control charts for variables – mean and range charts, revised control limits. Control charts for Attributes p-chart and C-chart.
			Paper VII Probability distribution II Unit 1.1 : Normal distribution (06)	Normal distribution and standard normal distribution, properties of normal curve, m.g.f., c.g.f., mean, variance, median, mode, mean deviation,
Feb.	24	24	Unit 1.1 : Normal distribution (04)	Measures of skewness & Kurtosis of normal distribution, distribution of linear combination, distribution of $X^2$ , where $X \sim N(0,1)$
			Unit 1.2: Continuous Bivariate distributions (12)	Definition of bivariate continuous r. v. (X, Y), Joint p. d. f., c. d. f., marginal and conditional p.d.f. independence of r. vs., Evaluation of probabilities, $E(g(X,Y))$ , means, variances, Covariance, correlation coefficient, conditional mean and variance. Theorems on expectation
			Unit 2.1: Transformations of Continuous Bivariate r.v.'s (08)	Distribution of bivariate r. vs. using Jacobin of transformation. Obtaining probability distribution of $X/(X+Y)$ , $X/Y$ , $X+Y$ , where X and Y are independent gamma variates, Examples and problems.
March	13	13	Unit 2.2.: Exact Sampling distributions (13)	Chi square variates & derivation of p.d.f. c.g.f., mean, variance, mode, skewness and kurtosis, additive property. Student's t- variate & derivation of p.d.f., mean, mode, variance, skewness, kurtosis Snedecor's F variate & derivation of p.d.f., mean, variance, mode. Distribution of 1/F. Inter relation between t, F and $\chi^2$